

Discovery and Research on Jiahu Bone Flutes in Wuyang, China

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The site of Jiahu is located in Jiahu village, Wuyang County, Henan province, on the Western edge of the broad plain of Huanhuaihai. On its north the site borders the Sha River, in the upper reaches of the Huai River; its latitude is 33°36'North, longitude 113°40'East, and it is 67.5 meters above sea level. Between 1983 and 1987, the Henan Cultural Relics and Archaeology Institute carried out six campaigns of excavation here, revealing an area of 2400 square meters. Except for the trial excavation in the spring of 1983, Zhang Juzhong has been in charge of all the excavations.

In early May 1986, while excavating tomb 78, Zhang Juzhong and Yang Zhenwei first discovered two funerary bone flutes. They soon found other, similar bone flutes in tombs 73, 94 and 121 respectively. Mr. Zhang's attention was instantly focussed on these remarkable finds. In the campaign of autumn 1986, one or two more bone flutes were discovered in each of tombs 233, 273, 263 and 270.

Finally, in the spring of 1987, again one or two bone flutes were found in each of the tombs 282, 363, 341, 411, 344 and 387. Up to the end of excavation in June 1987, altogether 25 bone flutes had been found, of which 17 were complete or almost complete, 6 broken or fragmentary and 2 were half-finished examples. Among the 17 complete bone flutes, there were 14 having seven holes, one five-hole, one six-hole and one eight-hole bone flute. In particular, the bone flute M282:20 was exquisitely made, and complete. Zhang Juzhong, the discoverer of the bone flutes, researcher Pei Mingxiang, the ex-director of the division, who came to the digging site to see the progress of the work, and their coworkers were all understandably very excited.

In July 1987, the excavations having ended, Zhang Juzhong, researcher Hao Benxing, ex-director of the Henan Cultural Relics and Archaeology Institute, researcher Pei Mingxiang, ex-director of the prehistoric division, and Shong Yuqin, teacher of Archaeology in Zhengzhou University, who supervised the students' practice at the Jiahu site, all came to Beijing bringing the recently-excavated seven-hole bone flute M282:20 and a turtle shell engraved with primitive writing. They consulted with Professors Su Bingqi, Hu Houxuan, Zhang Zhenglang and Li Xueqin, who are famous for their knowledge of Chinese archaeology, paleography and history, to identify and interpret the unearthed relics. Researcher Xiao Xinghua, who then acted as the assistant to the director of the Musical Institute of the Art School of China, was invited to make a detailed acoustical study of the bone flute and to determine its precise tonal production, that is, to establish its tonal scale.

Mr. Xiao was astonished and very excited to see the Jiahu bone flute, and ascertained that it was the earliest musical wind instrument in the world. Immediately the group contacted Liu Wenjin, the director of the Chinese National Music Ensemble. Liu Wenjin then asked artists of the Wind Band in the Ensemble to play the bone flute. It was Mr. Ning Baosheng that first actually played it and established its tone scale, giving us the approximate interval relationships of the different holes of the flute. Thus it was confirmed that a true musical instrument had been created more than 8000 years ago. Soon the responsible authorities decided upon a continuing research program involving these newly-discovered musical artifacts.

In early November 1987, at the invitation of the Henan Province Cultural Relics and Archaeology Institute the distinguished musical historian Prof. Huang Xianpeng, head of the Music Institute of the Chinese Art School and Professor Tong Zhongliang, president of the Wuhan Music Institute joined Researcher Xiao Xinghua, Engineer Gu Guobao and Xu Taoying to perform the laboratory acoustical measurement of the Jiahu bone flute. These measurements made with the well-preserved bone flute M282:20 suggested that melodies could be played in the context of a musical scale and that the flutes were truly the ancestors of wind musical instruments. In Chinese musical archaeology, the discovery of the Jiahu flutes is considered to be second in importance only to that of the famous serially-tuned bells unearthed at the Zeng Hou Yi tomb.

Recognizing the importance of these discoveries, and of the laboratory acoustical measurements, it was decided to announce them at a special conference first, and then to publish the preliminary research results in a paper written by Professor Huang Xiangpeng. It was also decided that Zhang Juzhong on behalf of the Henan Province Cultural Relics and Archaeology Institute, and Huang Xiangpeng on behalf of the Music School would continue further intensive research. They also reached an oral agreement that the complete research material and original data would be published in the excavation report of the Jiahu site, to be compiled by Zhang Juzhong, and that no more original data would be published anywhere except for the preliminary research results already published by Professor Huang Xiangpeng. During the 12 years from 1987 to 1999, all parties strictly adhered to this agreement. In February 1999 the two-volume *Wuyang Jiahu* compiled by the Henan Province Cultural Relics and Archaeology Institute under the editorship of Zhang Juzhong was formally published by the Science Press in Beijing. This comprehensive publication set forth all the original data and a large and important selection of excavation photographic documentation, in black and white and in color. The language of publication was Chinese, with index in both Chinese and English, and the coverage was so complete that *Wuyang Jiahu* may well become a model for all future excavation reports in China.

In accord with the oral agreement mentioned above, the Henan Province Cultural Relics Institute convened a special conference on 11 December 1987 in Zhengzhou, Henan, China, to reveal this important discovery to the media. Many Chinese wire agencies such as Xinhua Press, Chinese Central Television, People's Daily and its overseas edition, Guangming Daily and Chinese Relics Paper, reported the discovery in articles by their correspondents or by Zhang Juzhong. In 1989, the paper written by Huang Xiangpeng, which was entitled "Tone Measurement of the Bone Flute from Wuyang Jiahu", was published in the Chinese archaeological journal *Wen Wu* with an article entitled "Brief Report on the Second to the Sixth Excavations of the Neolithic Site of Wuyang Jiahu in Henan" by Zhang Juzhong. The publication of the "Brief Report..." and Professor Huang's musicological study triggered a great reaction in Chinese academic circles. Well-known music historians wrote papers on the Jiahu bone flutes, attesting to the high significance of the discovery. Mr. Wu Zhao from the Chinese Art School mentioned the flutes at the annual meeting of International Music Archaeology Association in 1990. It is particularly necessary to point out that these later articles dealing with musical history and archaeology, including that of Mr. Wu Zhao, were dependent on the data earlier published in *Wen Wu*. Some of these derivative and incomplete reports became known outside China after 1989.

In the autumn of 1997 Professor Garman Harbottle from the Brookhaven National Laboratory in New York came to Zhengzhou in Henan accompanied by Professor Wang Changsui, particularly to study the extraordinary artifacts unearthed from Jiahu, including the bone flutes. After a detailed introduction by Zhang Juzhong the artifacts were exhibited and discussed. Professor Harbottle sensed immediately the significance of these materials to our knowledge of the Neolithic worldwide, and the origins of Chinese civilization. He proposed at once that we collaborate to write articles to make these discoveries known abroad. When contacted, the editor of *Nature* suggested an article-length paper describing Jiahu and its significance, but later requested instead a "Letter" of about half the length, focussing on the early musical instruments. Because the book *Wuyang Jiahu* had not yet been formally published, the "Letter" relied on data previously published in Chinese in *Wen Wu*. In September 1999, when this letter was published in *Nature* (with a picture of the flutes on the front cover) about 100 organizations of popular media worldwide responded, and there was great academic interest in many countries. In September 2000, the International Music Archaeology Association particularly invited Zhang Juzhong, Xiao Xinghua and Wang Changsui to attend the annual meeting in Germany, introducing the musical discoveries and the on-going research.

After more than ten years research, we may conclude that to now the Jiahu bone flutes are the earliest musical instruments ever found in China. They are also the earliest playable musical instruments ever found, and have well-developed five-tone, six-tone and even seven-tone scales. These achievements lead the world by thousands of years, and have rewritten the musical history of China which had previously asserted that there was only a five-tone scale in use before the Qin Dynasty. The tones of the Jiahu flutes contain the basic elements of the twelve-tone equally-tempered scale.

Since the Jiahu bone flutes date to 9000~7800 aBP, their discovery also rewrites world musical history. We have found that there is a pitch in common throughout the interval relations of Jiahu bone flutes, and that is C6. Following Jiahu, the ten-hole bone flutes from the Zhongshanzhai site in Ruzhou, and the pottery instruments that Xuen and Bian Qing unearthed from other sites of Neolithic, Xia or Shang times, also tend to have the pitch of C6. "Gong", which is the chief tone of the serials bells from the Zeng Hou Yi tomb of Zhou Dynasty, is also C, which demonstrates that it is a tone having a very long artistic resonance among musicians. We feel sure that during the more than 6000 years from the early Neolithic age to the period of the Warring States (450 - 221 BC), man had a common knowledge and appreciation of the tone C, and that in the period of more than 2000 years from the Warring States up to now, its status has only become stronger. The discovery is globally significant in that the tone meets the pitch generally accepted in the world, and that there is a common knowledge of it in the human race.

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